CLAIMS

What is claimed as new and desired to be protected by Letters Patent of the United States is:

1. An imager device comprising:

a pixel array formed on an imaging chip and comprising at least one pixel providing a dark current signal; and

a circuit for providing a representation of temperature using said dark current signal, a fabrication process dependent parameter, and an imaging chip dependent value.

2. An imager device of claim 1 wherein said chip dependent value is based on a pixel reference dark current value taken at a reference temperature.

3. An imager device of claim 1 further comprising a storage device for storing said chip dependent value on said imager.

4. An imager device of claim 1 further comprising a circuit for adjusting an imager current based on said temperature representation.

5. An imager device of claim 2 further comprising a storage device for storing said reference dark current value and said reference temperature.

6. An imager device of claim 1 further comprising a plurality of said pixels supplying dark current signals which are selectively used to calculate a plurality of said temperature representations, each dark current signal being associated with at least one circuit used on said imager.

7. An imager device of claim 6 further comprising a circuit for determining at least one current correction signal based on at least one said temperature representation.

8. An imager device of claim 7 wherein said circuit determines a separate current correction signal for each said plurality of temperature representations.

9. An imager device of claim 7 wherein said at least one current correction signal is a master current correction signal for said imager device.

10. An imager device of claim 8 wherein at least one of said current correction signals is a master current correction signal for said imager device and at least one other of said current correction signals is a local circuit current correction signal.

11. A imager device of claim 1 wherein said fabrication process value is a value associated with of a plurality of imaging chips produced by the same fabrication process.

12. An imager device comprising:

a pixel array formed on an imaging chip and comprising at least one pixel providing a dark current signal; and

a circuit for providing a representation of at least one of a temperature of said chip and a temperature of a portion of said chip using said dark current signal, a fabrication process dependent parameter and an imaging chip dependent value.

13. An imager device of claim 12 further comprising a circuit for determining a correction signal based on said temperature representation.

14. An imager device of claim 13 wherein said correction signal is a correction circuit for correcting a current of said imager.

15. An imager device of claim 13 wherein said correction signal is a correction circuit for correcting an impedance of said imager.

16. An imager device of claim 13 wherein said correction signal is a correction circuit for correcting a resistance of said imager.

17. An imager device of claim 13 wherein said correction signal is a correction circuit for correcting a capacitance of said imager.

18. An imager device of claim 13 wherein said correction signal is a correction circuit for correcting a voltage of said imager.

19. An imager device of claim 12 further comprising a plurality of pixels provided at spaced locations within said array respectively supplying dark current signals, at least one pixel at each of said spaced locations providing a respective dark current signal which is associated with a respective area of said imaging chip, said circuit determining a separate temperature representation for each said area based at least in part on a respective one of said dark current signals.

20. An imager device of claim 19 further comprising a circuit for respectively adjusting a plurality of current signals based on a respective separate temperature representation.

21. An imager device of claim 20 wherein each adjusting circuit determines a current scaling value from an associated temperature representation using a look-up table.

22. An imager device of claim 21 wherein said look-up table has scaling values which are each associated with a representation of a temperature range.

23. An imager device of claim 12 wherein at least one pixel provides a plurality of dark current signals, said signals having more than one

integration time from which a dark current value is derived, said circuit using said derived dark current value in providing said temperature representation.

24. An imager device of claim 23 wherein said derived dark current value is derived from more than one said at least one pixel.

25. An imager device of claim 23, wherein said circuit derives said dark current from said pixels in a manner which removes common noise components present in the respective dark current signals of said of pixels.

26. A imager device of claim 12 wherein said fabrication process value is a value associated with a plurality of imaging chips produced by the same fabrication process.

27. An imager device of claim 12 wherein said chip dependent value is based on a pixel reference dark current value taken at a reference temperature.

28. An imager device of claim 12 further comprising a storage device for storing said chip dependent value on said imaging chip.

29. An imager device of claim 12 further comprising a storage device for storing said process dependent value on said imaging chip.

30. An imager device of claim 12 further comprising a circuit for adjusting an imager current based on said temperature representation.

31. An imager device of claim 27 further comprising a storage device for storing said reference dark current value and said reference temperature.

32. An imager device of claim 31 wherein said storage device is provided on said imaging chip.

33. An imager device of claim 12 further comprising a circuit for determining a current correction signal for a master current source for said imaging chip based on said temperature representation.

34. An imager device of claim 33 further comprising a plurality of pixels provided at spaced locations within said array respectively supplying dark current signals, at least one pixel at each of said spaced locations providing a respective dark current signal which is associated with a respective area of said imaging chip, said circuit determining a separate temperature representation for each said area based at least in part on a respective one of said dark current signals.

35. An imager device of claim 34 further comprising a circuit for respectively adjusting a plurality of current signals based on a respective separate temperature representation.

36. An imager device comprising:

a pixel array comprising a plurality of dark pixels, said dark pixels comprising at least one dark pixel for providing a plurality of dark current signals;

a memory which stores values comprising a process dependent value and at least one other value related to a reference dark current signal measured at a reference temperature; and

a circuit for calculating at least one temperature value based on a sensed dark current value, said process dependent dark current value, and said at least one other value, wherein said sensed dark current value is based on at least one of said plurality of dark pixel signals.

37. An imager device of claim 36 wherein said circuit removes a signal offset present in said plurality of dark current pixel signals prior to using said sensed dark current value to determine said temperature value.

38. An imager device of claim 36 further comprising a circuit for determining a current correction signal based on said temperature value.

39. An imager device of claim 38 further comprising a current multiplication stage for adjusting a first current signal using said current correction signal to produce a second current signal.

40. An imager device of claim 36 wherein said at least one other value related to a reference dark current signal is a chip dependent value stored at said imager device.

41. An imager device of claim 36 wherein said signals have more than one integration time.

42. An imager device of claim 36 wherein said fabrication process dependent value is related to temperature dependent dark current behavior of a plurality of imager chips containing said pixel array manufactured using the same manufacturing process.

43. An imager device of claim 36 wherein said at least one other value is a imager chip dependent value related to at least a reference dark current and temperature for said imager.

44. An imager device of claim 36 further comprising a plurality of pixel clusters, each cluster comprising at least one said dark pixel for providing a plurality of dark current signals, wherein said circuit calculates a respective temperature value for each of said pixel clusters.

45. An imager device of claim 44 further comprising a circuit for determining at least one current correction signal based on at least one said temperature value.

46. An imager device of claim 45 wherein said circuit for determining determines a plurality of current correction signals respectively associated with each said associated temperature value.

47. An imager device of claim 45 further comprising a current multiplication stage for adjusting a first current signal using said at least one current correction signal to produce a second current signal.

48. An imager device of claim 46 further comprising a plurality of current multiplication stages, each said multiplication stages multiplying an associated first current signal with a respective current correction signal to produce a respective corrected current signal.

49. An imager device comprising:

means for providing at least one reference pixel signal; and

means for determining at least one temperature value for said device based on said reference pixel signal, a fabrication process value, and at least one other value related to a reference pixel signal taken from said device at a reference temperature.

50. An imager device of claim 49 further comprising a means for adjusting a temperature dependent electrical property of said current signal based on a said determined temperature value.

51. An imager device of claim 44 wherein said at least one other value is a chip dependent value.

52. An imager device comprising:

means for providing a dark current signal;

means for providing a representation of temperature using said dark current signal, a fabrication process dependent parameter, and an imaging chip dependent value; and

means for adjusting at least one temperature dependant parameter of said device using said temperature representation.

53. An imager of claim 52 wherein said temperature dependent parameter is a current parameter.

54. An imager of claim 52 wherein said temperature dependent parameter is an impedance parameter.

55. An imager of claim 52 wherein said temperature dependent parameter is a resistance parameter.

56. An imager of claim 52 wherein said temperature dependent parameter is a capacitance parameter.

57. An imager of claim 52 wherein said temperature dependent parameter is a voltage parameter.

58. An imager device of claim 52 wherein said chip dependent value is based on a pixel reference dark current value taken at a reference temperature.

59. An imager device of claim 58 further comprising a means for storing said reference dark current value and said reference temperature.

60. An imager device of claim 52 wherein said fabrication process value is a value associated with a plurality of imager chips produced by the same fabrication process.

61. An imager device of claim 52 further comprising a means for storing said chip dependent value on said imager.

62. An imager device of claim 52 further comprising a means for supplying dark current signals which are selectively used by said means for providing a representation to calculate a plurality of said temperature representations, each said dark current signal being associated with at least one circuit used in said imager device.

63. An imager device of claim 62 wherein said means for adjusting adjusts a plurality of current parameters of said imager device in accordance with a respective one of said temperature representations.

64. An imager device of claim 62 wherein said means for adjusting adjusts a plurality of capacitance parameters of said imager device in accordance with a respective one of said temperature representations.

65. An imager device of claim 62 wherein said means for adjusting adjusts a plurality of impedance parameters of said imager device in accordance with a respective one of said temperature representations.

66. An imager device of claim 62 wherein said means for adjusting adjusts a plurality of voltage parameters of said imager device in accordance with a respective one of said temperature representations.

67. An imager device of claim 62 wherein said means for adjusting adjusts a plurality of resistance parameters of said imager device in accordance with a respective one of said temperature representations.

68. A method of determining temperature of an imager chip, said method comprising:

storing a fabrication process dependent value for an imager chip;

storing at least one chip dependent value representing a measured pixel dark current reference value and a reference temperature at which said chip dependent dark current reference value was measured;

measuring a dark current value of a pixel on said chip; and

determining a chip temperature representation based on said measured dark current value and stored values.

69. A method of claim 68 further comprising storing said fabrication process dependent value and said chip dependent value on said chip.

70. A method of determining and using temperature values of an imager chip, said method comprising:

storing a fabrication process dependent value for an imager chip;

storing at least one chip dependent value representing a measured pixel dark current reference value and a reference temperature at which said chip dependent dark current reference value was measured;

measuring a dark current value of a pixel on said chip;

determining a chip temperature representation based on said measured dark current value and stored values; and

correcting at least one temperature dependent parameter of said imager based on a respective said temperature representation.

71. A method of claim 70 wherein said parameter is a current.

72. A method of claim 70 wherein said parameter is an impedance.

73. A method of claim 70 wherein said parameter is a capacitance.

74. A method of claim 70 wherein said parameter is a voltage.

75. A method of claim 70 wherein said parameter is a resistance.

76. A method of determining temperature of an imager device, said method comprising:

acquiring at least one dark current signal from at least one pixel in a pixel array; and

determining a temperature value using said acquired dark current signal together with a fabrication process value, and at least one other value representing a reference dark current signal of a pixel of said pixel array taken at a reference temperature.

77. A method as in claim 76 wherein said at least one other value is an imager chip dependent value.

78. A method as in claim 76 further comprising storing said dark current signal and said reference temperature at said imager device.

79. A method as in claim 76 wherein said chip dependent value is stored at said imager device.

80. A method of claim 76 further comprising correcting at least one temperature dependent parameter of said imager device using said temperature value.

81. A method of claim 80 wherein said parameter is a current.

82. A method of claim 80 wherein said parameter is a resistance.

83. A method of claim 80 wherein said parameter is a voltage.

84. A method of claim 81 wherein said parameter is an impedance.

85. A method of claim 80 wherein said parameter is a capacitance.

86. A method of determining temperature of an imager chip, said method comprising:

acquiring at least one dark current signal at a plurality of locations of a pixel array; and

determining an associated temperature value for each of said locations using a respective said at least one dark current signal.

87. A method as in claim 86 further comprising respectively adjusting each of a plurality of temperature dependent parameters of said imager based on an associated said temperature value.

88. A method as in claim 87 wherein said parameters comprise a current.

89. A method as in claim 87 wherein said parameters comprise an impedance.

90. A method as in claim 87 wherein said parameters comprise a resistance.

91. A method as in claim 87 wherein said parameters comprise a voltage.

92. A method as in claim 87 wherein said parameters comprise a capacitance.

93. A method of determining an imager chip temperature comprising:

sampling a dark pixel signal with a first integration time;

sampling a second dark pixel signal with a second integration time;

providing a calibrated dark pixel signal using said first and second sampled dark pixel signals; and

calculating a chip temperature using the calibrated dark pixel signal and a fabrication process dependent value related to dark current and temperature, and a chip dependent value related to dark current and temperature.

94. A method as in claim 93 wherein said fabrication process dependent value is related to temperature dependent dark current behavior of a plurality of imager devices manufactured using the same manufacturing process.

95. A method of correcting a temperature dependant parameter for an imager chip comprising:

determining at least one correction value for an associated at least one temperature dependent parameter of an imager based on a temperature value, said temperature value being determined based upon a pixel value measured during said chip operation, a stored fabrication process dependent value related to dark current and temperature and a chip dependent value related to dark current and temperature; and

using at least one said value to adjust a respective temperature dependant parameter of at least one portion of said imager.

96. A method of claim 95 wherein using said value to adjust an associated temperature dependent parameter of said imager comprises adjusting a first current signal to produce a second current signal.

97. A method of claim 95 wherein said parameter comprises a capacitance.

98. A method as in claim 95 wherein said parameter comprises a current.

99. A method of claim 95 wherein said parameter comprises a voltage.

100. A method of claim 95 wherein said parameter comprises a resistance.

101. A method of claim 95 wherein said parameter comprises an inductance.

102. A method of claim 95 wherein said fabrication process dependent value is related to temperature dependent dark current behavior of a plurality of imager devices manufactured using the same manufacturing process.

103. A method of determining an imager chip temperature comprising:

sampling a first and second dark pixel signals from each of a plurality of dark pixel clusters, each said cluster sampling comprising:

sampling a first dark pixel signal with a first integration time; and

sampling a second dark pixel signal with a second integration time;

calculating a calibrated dark pixel signal for each dark pixel cluster using said first and second dark pixel signal of each cluster; and

calculating a separate chip temperature for each said dark pixel cluster using a said calibrated dark pixel signal for each said cluster and a fabrication process dependent value related to dark current and temperature, and a chip dependent value.

104. A method of correcting a current source on an imager comprising:

determining a plurality of unique current correction signals, wherein each unique current correction signal is associated with one or more circuit components of an imager chip, wherein said determining of a plurality of

unique current correction signals is based on a temperature value associated with said components;

multiplying each of said unique current correction signal with a current signal to produce a corrected current signal for each component; and

supplying each of said corrected current signals to each associated circuit component.

105. A method as in claim 104 further comprising:

determining a master current correction signal based on a temperature of said imager chip; and

controlling a master current with said master current correction signal.

106. A method of correcting temperature dependant signals on an imager comprising:

determining a plurality of correction signals, wherein a unique correction signal is associated with one or more circuit components of an imager chip, wherein said determining of a plurality of correction signals are based on a temperature value associated with said components determined based upon a dark pixel signal, a fabrication process dependent value related to dark current and temperature, and a chip dependent value; and

correcting at least one temperature dependent property on said imager based on an associated said correction signal.

107. A method as in claim 106 further comprising:

determining a master current correction signal based on a said temperature of said imager chip; and

controlling a master current with said master current correction signal.

108. A method as in claim 106 wherein said correction signals comprises a voltage correction signal

109. A method of claim 106 wherein said correction signals comprises a capacitance correction signal.

110. A method of claim 106 wherein said correction signals comprises an inductance correction signal.

111. A method of claim 106 wherein said correction signals comprises a resistance correction signal.

112. A method of claim 106 wherein said correction signals comprises a current correction signal.